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THE IDEALS AND STANDARDS OF SIGMA XI

By Charles S. Prosser

It happened that during the years of the inception of Sigma Xi the writer was closely associated with Professor Henry S. Williams of Cornell University as a graduate student and instructor in his department and was often favored with his views concerning the need of an honor scientific society, to which students of marked scientific ability for research might be elected. A brief statement of Professor Williams' connection with the organizations at Cornell that finally merged into Sigma Xi is important in a consideration of its ideals. The writer does not remember the exact date when this topic was first mentioned to him by Professor Williams, but would say that it was probably some time in 1883. From time to time he spoke of his efforts to interest other Cornell professors in natural history in such an organization; but the senior professor was so opposed to any organization using Greek letters for its name that Professor Williams received little encouragement. Finally, in the spring of 1886, he decided to organize an honorary geological society composed of students that had studied at Cornell and given promise of marked research ability in this science. This organization was called The Society of Cornell University Geologists, and during commencement week of June, 1886, those that had been selected for membership, who were in Ithaca, were asked to meet in the Geological Laboratory, where a short speech was made by Professor Williams. After this speech each member was presented with a small geological hammer on one side of which his initials and date of graduation had been stamped, and on the other side S. C. U. G. (the initials of the society). This was accompanied by a letter stating that: "In recognition of the excellence of your scientific scholarship attained while under instruction in Cornell University, I take pleasure in presenting you with the badge of membership of the Society of Cornell University Geologists—(a geological hammer appropriately stamped with S. C. U. G. and date of graduation).

May it ever be used in truthfully interpreting the laws of nature, to the honor of your Alma Mater and the good of mankind.

Henry S. Williams,
Teacher in Cornell University,
June 17, 1886."

The hammers were given to the following Cornell graduates, according to a list furnished by Professor Williams, who thus became members of this society: F. W. Simonds, '75; J. A. Holmes and F. C. Curtice, '81; J. C. Branner, '82; E. H. Preswick and C. S. Prosser, 83; C. D. [David] White, A. L. Coville and R. T. Hill, '86.

This society, however, was not of broad enough scope to satisfy Professor Williams and he drew up a preamble for a national scientific organization, one paragraph of which is of especial importance in this connection. It reads as follows: "Therefore we believe it is highly desirable to encourage high attainments among the future students of Cornell University and other kindred institutions by recognizing by some mark of honor those who exhibit special ability in investigating, understanding and interpreting the facts of nature in the various branches of modern science . . . .

This society shall be known as the Society of Modern Scien-
discrete
tists or by the letters *O. D. P., observare—intellege at patefice.*"

In a letter to the writer, dated December 31, 1903, Professor Williams stated that this preamble: "I seem to have written out before I knew anything about Sigma Xi, and the foundation elements of research; i. e., observation, discernment and exposition or interpretation, signified by the Latin words *observare*, intellege (or *discrete*, which is put above it as having been my second thought) and *patefice*, I think will stand examination as indicating the most important directions which modern development of education is taking."

The story of the beginning of an independent movement for the formation of an honorary scientific society at Cornell by William A. Day and Frank Van Vleck shortly before the 1886 Commencement, and the organization of the Society of the Sigma Xi the following fall with a membership of nine engineers, has been told in several publications. Professor Williams learned of this movement when he attempted to get the Engineering Department to join hands and select men in the same way from those departments that he was advocating for the departments of pure science. He found that the formal organization of Sigma Xi had gone further, which led to his adopting that as a working nucleus and suggesting to the engineers that it be made a University society. This proposal was favorably received and he dropped his own movement for a

Society of Modern Scientists. The minutes of the second meeting of Sigma Xi state that the proposals of Professor Williams were accepted, and at the fourth meeting he was nominated for a member of the Society and unanimously elected. It was obvious to the early members of the Cornell chapter that Professor Williams became the leader of the movement, and in May, 1887, he was elected its first President. At the following Commencement he delivered an address entitled "The Ideal Modern Scholarship" at the inauguration of the Alpha Chapter at Cornell University, on June 15, 1887. In this address it was stated as the third essential for the "ideal modern scholar that he must be a specialist, which means that he must take his place among the workers of the world, and fill that place. In his specialty he must think for himself, plan for himself, act for himself. Here he must rest on no one, but be himself a support of others."[1]

The importance of research in the qualification for membership in Sigma Xi was emphasized by Professor Williams in his report on behalf of the Committee on Extension at the second convention of the Society in Springfield, Massachusetts, in August, 1895, when he said that:

"It proposed to recognize and elect to its membership those men in our institutions of learning who should exhibit in a marked degree the qualifications of natural endowment and training required for successfully conducting original research in the various branches of science.

"Thus *original research* bears the same relation to Sigma Xi, as literary scholarship does to Phi Beta Kappa; and it is believed that the cause of original research, and that part of the higher education which trains the qualities required in scientific pursuits, will be benefitted by honoring with election to Sigma Xi those men who during their college course show marked proficiency in these directions."

The importance of Professor Williams' counsel and influence in the organization of Sigma Xi was unquestionably very great, as is indicated in the preceding part of this article. It is sometimes said that Sigma Xi was founded by a group of engineers who did not attach any great weight to the ability to carry on original research. This perhaps might have been true if Professor Williams had not become an active member of the group of founders, at so early a date and impressed upon them the importance of founding a national honorary scientific society with broad ideals, in which

[1] The Ideal Modern Scholarship, Ithaca, 1887, p. 8.

the ability to conduct independent research, or the promise of such ability in undergraduates, should be regarded as the first and most important qualification for membership. The honor of its membership was intended for those scientific students who were striving to increase the sum of human knowledge; and not particularly for those who planned to become wealthy by means of applied science in the business world, for those who wished to lead lives of ease, or, finally, for those who wished to shine in the social world. How foreign these things were to the aims of the Alpha Chapter of Sigma Xi was ably expressed by Dr. E. B. Titchener in his presidential address to the Cornell Chapter in June, 1900; an address which ought to have large circulation among the various chapters of this Society. Among other things Professor Titchener said:

"I pass to the third portion of my address: to a characterization of the life which we, as votaries of science, may hope or must expect to lead in the modern state. And it seems to me that there is a kind of balance-sheet to be struck; that there are certain definite gains, and certain definite sacrifices in the scientific life; and that it will be of profit for us to face the issues squarely, lest we find ourselves undeceived when it is too late to turn back.

"In the first place, the scientific man takes the vow of honorable poverty. We may, of course, have extraneous sources of income. But there is no money in science . . . .

"There is, indeed, a great gulf fixed between the world of business, with its self-seeking and bargaining, and the world of science, with its self-renunciation and mutual confidence. The difference will force itself upon you in all sorts of unexpected ways.

"There is a second vow that the scientific life demands: the vow of hard work. Science is an exacting task mistress; and those who follow her must 'shun delights and live laborious days'. Nor is this a light matter. Man is by nature a lazy animal. The power of sustained work comes late in the history of the individual, as it comes late in the history of the race; and the love of sustained work comes later still. And all scientific work is sustained work. No one knows, but the scientific man himself, all the wasted labor and irrational thinking and sheer loss of time involved in the very smallest addition to the sum of knowledge . . . .

"There is lastly a third vow to be taken: the vow of isolation. The life of the man of science must be a lonely life. It is not only that we have, most of us, to do our scientific work, as Helmholtz said, in our spare time, so that we have little leisure for the amenities of the social life around us. That is something, truly;

but there is more than that. If we are to carry science beyond her present bounds, in any field of work, we must specialise. And that means that we shall hardly find, away from university centers, even one or two of our acquaintances who are in intelligent sympathy with us; we must work alone. Even within a university, the number of men who thoroughly understand and appreciate their neighbor's work must be small."

In the writer's mind there has never been any question but that membership in Sigma Xi was intended primarily for those professors, instructors and graduate students conducting original scientific investigation, and those undergraduates giving promise of such ability. Or, as Professor Titchner so well expressed it in the above mentioned address to the members-elect of Sigma Xi·

"Some of you are taken from the instructing staff of the University. You, Instructors, we welcome as proved men, tried servants of science, our common mistress. Many of you are drawn from the ranks of the graduate students. You, Graduates, we welcome, because you have paused now, at the outset of your career, to do something for the furtherance of human knowledge; and,—what I think is more important even than that,—because you have paused to prepare yourselves to carry the message of science into all those various spheres of activity to which you shall presently be called. Many of you, again, are undergraduates. You, Undergraduates, we welcome,—not because you have done good work in your courses; anybody can do good work in his courses,—but because we think we discern in you some promise of ability to perform scientific work, and some promise of good will to realize that ability. Weigh that well, you who are to form the youngest generation of this Society of the Sigma Xi; do not think lightly of it, or of the men whose opinion it now is."

The writer was asked to say something in this article concerning the "Uniformity of Standards." An active membership of several years duration in three different chapters of Sigma Xi has taught him that up to the present time, at least, there is a good deal of difference in the standards of the various chapters. His ideals were naturally those of the Alpha Chapter, and sometimes it has appeared as though some of the other chapters had not caught the real meaning of Sigma Xi. This condition, however, was the natural result of the method under which some of the chapters were organized. The charter membership included all those professors that taught scientific subjects, or in some instances even professors that taugh non-scientific subjects to scientific students.

Naturally, part of these professors were not engaged in original investigation and had no particular sympathy with or comprehension of it. Their criterion for the election of a student was almost invariably that of high marks. This standard not infrequently led to controversy when the name of a student with lower marks, but better promise of original research, was proposed for election. In some instances the discussions have been strenuous, as in one meeting when the Professor of English in one institution made a speech deploring the effort to lower the standard of Sigma Xi, as he expressed it, when the name of the senior who gave the most promise of ability to conduct scientific research was proposed; but the average of whose marks for the four years of his course was lower than that of some other students. In the chapters, however, which have come under the writer's observation it is his opinion that the number of those who believe in this standard for Sigma Xi has decreased, as well as their influence.

There is still considerable difference of opinion as to what constitutes "promise of marked ability in those lines of work which it is the object of this Society to promote," as stated in the Constitution, when it comes to the election of undergraduates. The difference of view is probably most marked between the professors in the departments of pure science and those of the technical or applied sciences. It happens that the students of the former group of professors have usually made some minor investigation and not infrequently published something concerning it; while such evidence of research is less frequent among the students of the second group of professors. The difficulty which arises at election is that apparently the professors of the second group base their nominations more generally upon the standing of the student as indicated by his marks in the Registrar's office, while the students of the other class have done something that gives promise of ability to carry on scientific research. It has been suggested that in the engineering colleges those students with a high class standing might be elected members of Tau Beta Pi, the honorary engineering society, or Eta Kappa Nu, the honorary electrical engineering society, and there are doubtless other honorary societies for technical students; while the smaller number who had actually done something in the line of original research might be elected to Sigma Xi. Naturally, some students would be elected to Sigma Xi and at least one of the other honorary technical societies, the same as at present, some students are elected to both Phi Beta Kappa and Sigma Xi. This question is one that arises principally in those chapters where undergraduates are elected and probably is relatively unimportant in those where only graduates and members of the teaching staff are elected to membership. It is the writer's belief that the publication in the Sigma Xi Quarterly of the chapter reports giving lists of the new members, together with the title of their original work, will do much toward making the standards of election more uniform. In fact, it appears to him that the appearance of this periodical marks an epoch in the uplift of the standards for the whole society of Sigma Xi.

Ohio State University.

THE ELECTION OF NEW MEMBERS

By F. K. Richtmeyer

If one may judge from the brief reports already presented, one of the most pressing needs of the society is some method of standardizing the criteria followed in the selection of new members. At the present time, not only is there great diversity of practice among the several chapters, but, judging from our own chapter (Cornell) different departments in the same chapter differ as to the necessary qualifications of the candidate. * In spite of careful consideration given to the subject during the past six or eight years by various special committees of our chapter, we are still as far as ever from a satisfactory interpretation of (c) and (d) of Art. III, Sec. 4, of the constitution, regarding the qualifications for resident graduates and undergraduates.

For example: What is included in "Scientific investigation?" Does "A Study of the Market Conditions of [Some Commodity]" when done by a student of a technical college, whose students are eligible to membership, differ materially from the same thesis when done by a student in the department of Economics, students from which are not eligible to membership?

Does a candidate show "aptitude for scientific investigation" by reworking data which has been compiled from other sources, but which he himself has had no part in obtaining?

Does "actual work" mean the *completion* of some thesis or

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*"Candidate" is here used as "one who is being considered by the chapter for membership"; not, of course, as "one who has applied for membership."